Name: Date:

Exam: Function Reflections (Solution version 630)

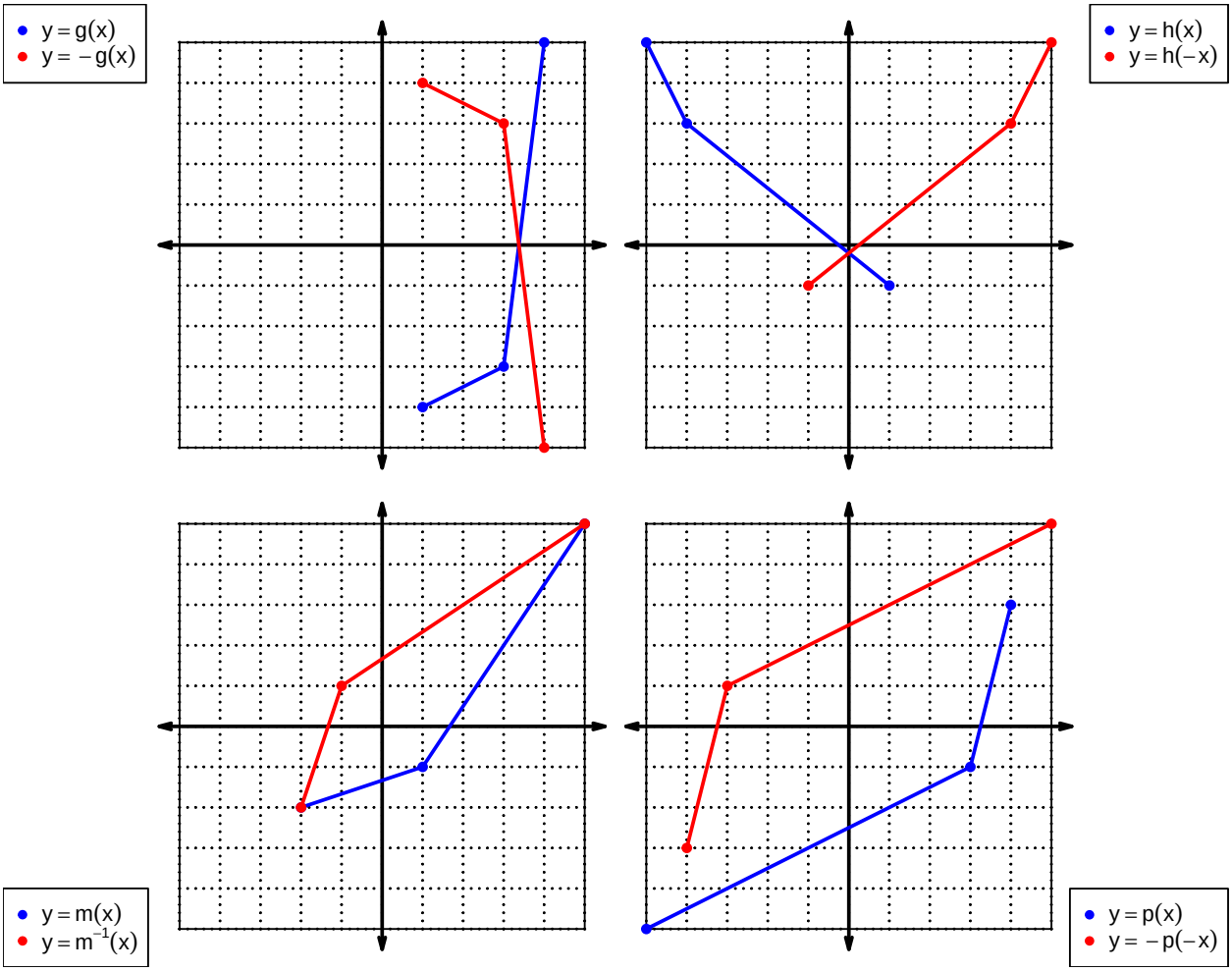
1. (worth 9 points) Let function f be defined by the polynomial below:

$$f(x) = 4x^5 + 7x^4 + 8x^3 + 2x^2 + 9x + 3$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials
$-f(x)$	$-4x^5 - 7x^4 - 8x^3 - 2x^2 - 9x - 3$
$f(-x)$	$-4x^5 + 7x^4 - 8x^3 + 2x^2 - 9x + 3$
$-f(-x)$	$4x^5 - 7x^4 + 8x^3 - 2x^2 + 9x - 3$

2. (worth 20 points) In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	9	4	7
2	1	9	6
3	4	7	5
4	5	2	8
5	6	1	2
6	3	8	4
7	2	6	3
8	7	3	1
9	8	5	9

3. (worth 3 points) Evaluate $g(6)$.

$$g(6) = 8$$

4. (worth 3 points) Evaluate $h^{-1}(3)$.

$$h^{-1}(3) = 7$$

5. (worth 3 points) Assuming f is an **even** function, evaluate $f(-5)$.

If function f is even, then

$$f(-5) = 6$$

6. (worth 3 points) Assuming h is an **odd** function, evaluate $h(-9)$.

If function h is odd, then

$$h(-9) = -9$$

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7. (worth 15 points) A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
Let polynomial p be defined with the following equation:

$$p(x) \;=\; x^3 + 1$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) \;=\; (-x)^3 + 1$$
$$p(-x) \;=\; -x^3 + 1$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) \;=\; -\left(-x^3 + 1\right)$$
$$-p(-x) \;=\; x^3 - 1$$

c. Is polynomial p even, odd, or neither?

neither

d. Explain how you know the answer to part c.

We see that $p(x)$ is not equivalent to either $p(-x)$ or $-p(-x)$, so p is neither even nor odd.

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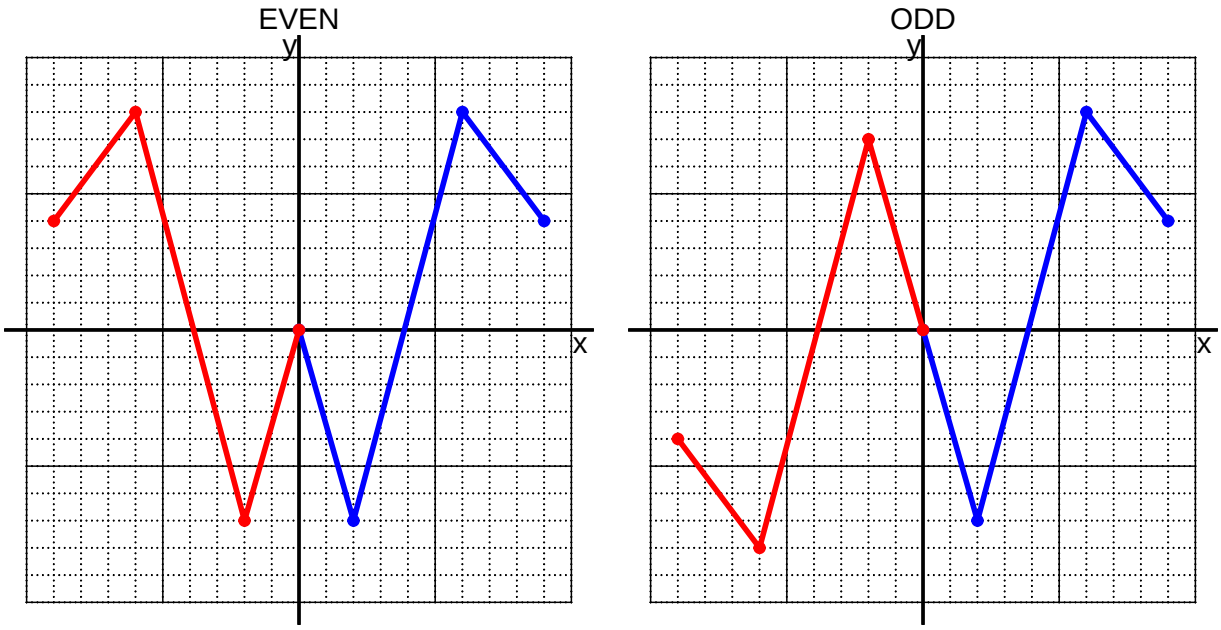
8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.



9. (worth 10 points) Let function f be defined with the equation below.

$$f(x) = 5(x-2)$$

a. Evaluate $f(20)$.

step 1: subtract 2
step 2: multiply by 5

$$f(20) = 5((20)-2)$$
$$f(20) = 90$$

b. Evaluate $f^{-1}(70)$.

step 1: divide by 5
step 2: add 2

$$f^{-1}(x) = \frac{x}{5} + 2$$
$$f^{-1}(70) = \frac{(70)}{5} + 2$$
$$f^{-1}(70) = 16$$

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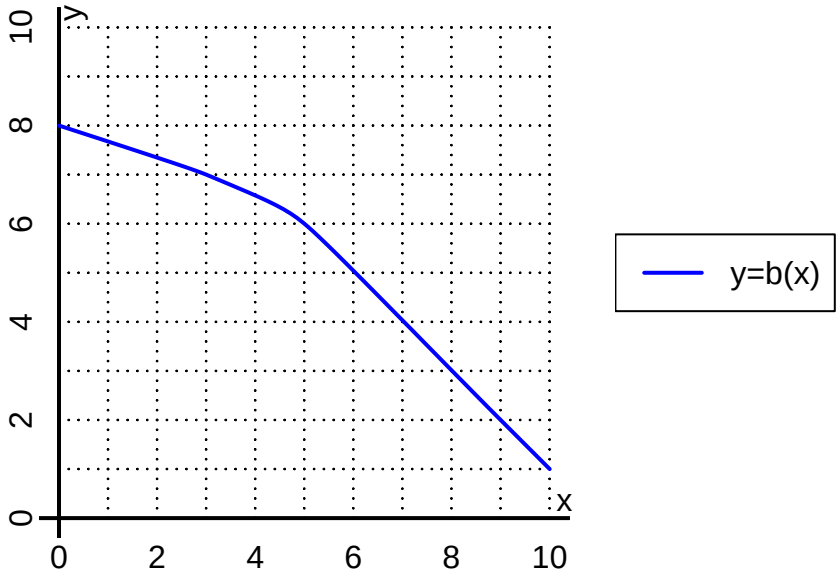
10. (worth 6 points) The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(3)$.

$b(3) = 7$

b. Evaluate $b^{-1}(2)$.

$b^{-1}(2) = 9$

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11. (worth 18 points) Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-7	7	-7	7
-1	6	-6	6	-6
0	0	0	0	0
1	6	-6	6	-6
2	-7	7	-7	7

b. Is function f even, odd, or neither?

even

c. How do you know the answer to part b?

Function f is even because column $f(-x)$ matches column $f(x)$ exactly.